



US Army Corps
of Engineers

DCAF Bulletin

Design Construction Analysis Feedback

No. 97-09 Issuing Office: CEMP-CE Issue Date: 2 JUN 97 Exp. Date: 31 DEC 99

CEMP-C

Subject: Reinforcing Bar "Mushroom" Safety Caps

Applicability: Information

PURPOSE: This DCAF Bulletin covers the current protection which is afforded by rebar mushroom caps to prevent impalement hazards.

DISCUSSION: OSHA has found that standard unreinforced mushroom style rebar caps are not an acceptable method of protection against impalement of an object falling on rebar. These caps do not meet the requirements of paragraph (b) of OSHA Standard 1926.701, which reads:

"All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to prevent the hazard of impalement."

There are no unreinforced mushroom caps on the market currently which meet the impalement test conducted by California OSHA. These tests involved dropping sand-filled canvas bags from three to seven feet onto #4 rebar with sheared ends and covered with standard mushroom caps.

California OSHA has approved certain protective covers which have reinforcing metal inserts as follow:

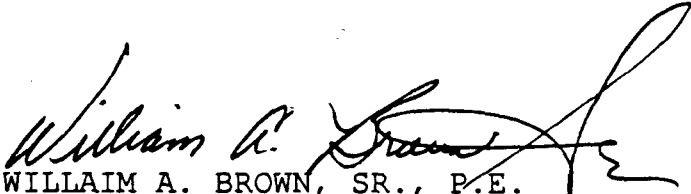
| <u>Company</u> | <u>Model</u> | <u>Description</u> | <u>Impalement Protection</u> |
|--------------------------------|--------------|--|------------------------------|
| Deslauriers Inc. | RGR4 | 2" wide x 4 ft. long plastic trough | At Grade |
| | RGR8 | 2" wide x 8 ft. long plastic trough | At Grade |
| | RGR4C | 4" wide x 4 ft. long plastic trough | To 7 1/2 ft. Above Grade |
| | RGR8C | 4" wide x 8 ft. long plastic trough | To 7 1/2 ft. Above Grade |
| Don De Cristo Concrete Acc. | PC-100 | 4" x 4" plastic cap with metal insert | To 7 1/2 ft. Above Grade |

Job fabricated protective troughs may be used. They must pass a test done by dropping a 250 pound canvas sand bag, 36 inches in circumference long enough to contain the required sand, at least 10 feet directly over a #4 reinforcing bar with a sheared end protruding between six and seven inches from its support and with the protective trough being tested. If the test specimen is supported by more than one rebar, there shall be at least three rebars spaced at least 24 inches apart. The sand bag shall be dropped over the center rebar.

The unreinforced plastic caps provide SCRATCH PROTECTION ONLY according to their manufacturers and were never intended to protect against impalement. They may be used for their intended purpose but, as stated before, they provide no impalement protection either above grade or at grade. California OSHA denied a petition by California AGC to allow these caps for protection at grade in 1995, however OSHA has issued interim guidance allowing these caps to be used at grade while more investigations are done. To date apparently no fatalities have occurred from their use at grade but fatalities have occurred when they were relied upon for above grade protection.

The 4" wide troughs and caps cited above provide impalement protection up to a 7 1/2 foot fall. No device is certified to protect from a fall of over 7 1/2 feet. The fall protection provisions of EM 385-1-1 should be enforced at all times but strictly enforced when workers are 6 feet or more above grade and the hazard of impalement exists.

This DCAF Bulletin has been coordinated with HQUSACE Safety Office (CESO) and is based on information provided on this subject by OSHA and CALOSHA.


WILLIAM A. BROWN, SR., P.E.
Acting Chief, Construction Division
Directorate of Military Programs